**Amendments to the Specification**

Please replace paragraph [0007] with the following amended paragraph:

**[0007]** The invention will be better understood with reference to the drawings taken in connection with the detailed description which follows:

Figure 1 is a cross-sectional area of a wellbore showing a well head manifold of the present invention;

Figures 2A, 2B, 2C and 2D are prospective illustrations of four prior art plungers;

Figure 3 is a cross-sectional view of one embodiment of a chemical dispenser of the present invention;

Figure 4 is a cross-sectional view along line 4-4 of Figure 3;

Figure 5 is a partial cross-sectional view showing one embodiment of an attachment mechanism of the present invention;

Figure 6 is a partial cross-sectional view of another embodiment of the present invention;

Figure 7 is a cross-sectional view of yet another embodiment of the present invention;

Figure 8 is a partial cross-sectional view of another embodiment of the present invention;

Figure 9 is a cross-sectional view of an embodiment of the present invention;

Figure 10 is a cross-sectional side view of another embodiment of the invention utilizing a coiled tube plunger with applied [freezing] treatment chemical [treatment] solution;

Figure 11 is a side view of a brush plunger with applied treatment chemical [treatment solution];

Figure 12 is a side view of a plunger/dispenser of the present invention;

Figure 13 is a cross-sectional view of Figure 12 along line 13-13; and

Figure 14 is a partial cross-sectional view of an embodiment of the chemical dispenser of the present invention.

The drawings illustrate certain preferred embodiments of the invention and like elements have been provided with like reference numerals to corresponding items between various drawings.

Please replace paragraph [0008] with the following amended paragraph:

**[0008]** The present invention relates to a method and apparatus for delivery of treatment chemicals to a wellbore utilizing artificial lift techniques. In the method of the present invention treatment chemical for treating a downhole formation that is delivered to the bottom of the wellbore in association with the placement of a plunger at the bottom of the wellbore. One embodiment, the invention relates to a method of applying the treatment chemical to a known plunger, such as a coiled tube plunger, or a brush plunger in the form of a gel, putty, paste or other suitable consistency such that a significant portion of the treatment chemical will be retained on the plunger as it is dropped from the well head to the bottom of the wellbore. Once at the bottom of the wellbore, the fluid in the wellbore dissolves or mixes with the treatment chemical which dissociates or diffuses into the wellbore, treating the wellbore and the near wellbore area. At predetermined times when the plunger returns to the surface additional treatment chemical can be applied to the plunger before it is again dropped to the bottom of the wellbore. Alternatively, the method can be conducted by placing the treatment chemical within a chemical dispenser attached to a standard plunger, or in a specifically designed plunger/dispenser device which is a combination of a plunger and dispensing unit.

Please replace paragraph [0018] with the following amended paragraph:

**[0018]** The petroleum well will have a wellbore 10 which typically contains a casing 12 either throughout the entire bore or a portion of the wellbore. The wellbore 10 can also contain tubing 14 within the casing 12. In a typical arrangement, the well production will flow through the tubing 14 to the wellhead 16. For purposes of illustrating the invention, the invention is discussed in relation to a gas well. For gas lift operations the tubing 14

can be provided with a stop 18 at the lower end of the tubing 14, a plunger 20 which travels in the tubing 14, at the wellhead 16. In a typical arrangement, a manifold 22 is provided at the wellhead 16 which can have a plunger catch 30 to hold the plunger in place, a lubricator 32 to lubricate the plunger 20, and a control box [34] (not shown) to control the flow of gas and liquid from the well by operating the valves 24, 26, and 28 and related conduits.

Please replace paragraph [0019] with the following amended paragraph:

**[0019]** The stop 18 is to prevent the plunger 20 from falling below the position of the stop 18. The stop 18 can include a spring [36] 34 or other shock absorbing device to reduce the impact of the falling plunger 20. The plunger 20 can be of any of the numerous designs which are known in the art or another delivery system as described herein. The plunger 20 provides a mechanical interface between the gas 38 and the liquid 40 present in the well. Shutting the well off at the surface allows the plunger 20 to fall to the bottom of the well and rest on the stop 18. The pressure differential between gas trapped in the wellbore between the casing 12 and tubing 14 and in the tubing 14 above the plunger increases. The fluid will pass around the plunger 20 through a space left between the plunger 20 and the tubing 14 or through passageways in the plunger. Gas pressure builds in the well, and when the well is opened, the gas will push the plunger 20 and the liquid on top of the plunger up the tubing 14 to the surface.

Please replace paragraph [0020] with the following amended paragraph:

**[0020]** When the plunger 20 reaches the top of the well it enters or is received by the manifold 22. The manifold 22 can include a shock absorbing spring 42 or other mechanism to reduce the impact of the plunger. Appropriate sensors are provided to detect arrival of the plunger 20 at the surface and to activate plunger catch 30 which holds the plunger 20 until a signal is received to release the plunger 20. The control box [34] (not shown) contains circuitry for opening and closing the appropriate valves 24, 26, and

28 during the different phases of the lift process, applying lubrication, if desired, to the plunger from lubricator and releasing the plunger to return to the bottom of the tubing 14.

Please replace paragraph [0022] with the following amended paragraph:

**[0022]** Figures 2A, 2B, 2C, and 2D illustrate several prior art plungers. These figures show several types of prior art plungers, and is not intended to be all inclusive. Figure 2A illustrates a coiled tubing plunger 44. Each end of the coiled tubing plunger 44 is provided with a neck 46. Necks 46 are provided in most plungers to provide an area where the plunger can be caught by the plunger catcher, and also to provide an area which may be engaged by a downhole tool in the event the plunger becomes stuck in the tubing. Figure 2B illustrates a brush plunger 48. Brush plunger 48 is also provided with necks [44] 46 at each end. The brush 50 may be a flexible nylon brush, a metal fiber brush or a brush made from any other suitable material. Figure 2C illustrates a solid bar stock plunger 52. The bar stock plunger 52 has necks [44] 46 at each end, and has a plurality of ridges or a helical groove 54 along its length. Figure 2D illustrates a pad plunger 56 which has pads 58 which are made up of pad plates 60. The pad plates 60 can be spring loaded so that they expand or contract to maintain contact with the inside of the tubing. The illustrated pad plunger 56 is a two-pad plunger but pad plungers can have one or more pads. The illustrated pad plunger 56 has a neck [42] 46 at the top. However, a neck can also be provided at the opposite end. Each plunger has one or more interface sections 62 which are the portions of the plunger designed to interface with the inside of the tubing.

Please replace paragraph [0023] with the following amended paragraph:

**[0023]** Other types of plungers include a wobble washer plunger (not shown) which has a series of shifting rings placed along the length of the plunger to maintain contact with the inside of the tubing; and a snake plunger (not shown).

Please replace paragraph [0024] with the following amended paragraph:

**[0024]** Referring now to Figure 3, there is shown a delivery system 64 for chemicals. Only a portion of the plunger 20 is shown. The system 64 is a plunger 20 with an attached chemical dispenser [66] 65. [For purposes or illustration, embodiment of a chemical dispenser 65.] The plunger 20 can be of any known design which has a neck 46 on the lower end. In this embodiment, chemical dispenser 65 has a head portion 66 and a member 68 which defines a receptacle 70 for receiving treatment chemical 72. Head 66 defines an opening [72] 95 to receive the lower portion of plunger 20 and the plunger neck 46. Head 66 includes attachment mechanism for attaching the dispenser [64] 65 to the plunger. One attachment mechanism can be a set screw in threaded passageway 78 in head 66. Another attachment mechanism can be a spring loaded bolt 80 in passageway 82. A spring 84 biases the bolt 80 against the neck 46 of the plunger 20. A ridge 86 can be provided in the passageway 82 against which the spring 84 rests. To remove the head 66 the bolt 80 and screw 76 are retracted. For purposes of illustration two different attachment mechanisms are shown in Figure 3. Typically one or more of the same attachment mechanisms will be utilized, for example, one or more set screws 76, one or more bolts 80, rather than having a mixture of different types of attachment mechanisms.

Please replace paragraph [0025] with the following amended paragraph:

**[0025]** The chemical dispenser 65 should securely attach to plunger 20. In some applications it may be desirable for the chemical dispenser 65 to have some play in the connection between the plunger 20 and the chemical dispenser 65 to permit a slight wobble. Some operators may prefer a more rigid fit, in which case, a portion of the upper surface 90 of head 66 can be a shaped surface which mates with a corresponding surface 92 on the plunger 20 so as to limit the movement of the plunger with respect to the dispenser. In a preferred embodiment, one or more upper ports 94 are provided, and one or more lower ports 96 are provided. Upper ports 94 allow gas and liquid to enter or leave the receptacle 70. While the plunger is falling in the tubing the primary function of ports

94 is to exhaust any gas and liquid which may enter the receptacle to aid the fall of the plunger. Once the plunger has reached the stop at the bottom of the tubing the upper ports 94, if below the liquid level, will function to allow chemical contained in the receptacle to diffuse into or mix with the liquid. Lower ports 96 allow liquid to enter and leave the receptacle [76] 70. In the illustrated embodiment, the lower ports 96 are on the bottom surface of the [body 74] member 68; however, they can also be positioned on the side walls. Preferably, a valve 98 is provided. In the illustrated embodiment, valve 98 is a flexible rubber sheet 100 having a dimension sufficient to cover lower ports 96. Valve 98 is held in place by a retaining plug 102 which can extend through an opening 104 in the bottom of the member 68. The purpose of valve 98 is to either restrict or close off the flow of liquid through lower ports 96 as the plunger drops. As the plunger drops in the tubing, the flexible sheet 100 will be pushed against the bottom of the member 68. This will either completely seal or partially seal off ports 96. The purpose of valve 98 is to minimize or prevent the flow of fluid through receptacle 70 while the system drops in the tubing. This will prevent or minimize the washing of chemicals out of the receptacle as the chemical dispenser 65 passes through the fluid above the stop of the tubing. Once the delivery system 64 comes to rest on the stop, flexible sheet 100 will fall away from the bottom of member 68 and to a second position 102 (shown in phantom), because there is no force pushing the flexible sheet 100 against the bottom of member 68. This will allow liquid to enter receptacle 70 and leach the treatment chemical 72 out of receptacle 70.

Please replace paragraph [0027] with the following amended paragraph:

**[0027]** Figure 4 is a cross sectional view of Figure 3 across line 4-4. It illustrates a plurality of lower ports 96. Through a center opening 104 passes a portion [104] of the valve in the form of flexible sheet 100.

Please replace paragraph [0029] with the following amended paragraph:

**[0029]** Figure 6 is a partial view of a chemical dispenser 116. In this embodiment, a cap 126 having a threaded surface 128 for engaging threaded surface 130 of the wall 135 defining the receptacle 70 is provided. The cap 126 contains lower ports 96. The wall defining the receptacle defines upper ports [96] 94. In this embodiment, between head 118 and [receptacle section] chemical dispenser 116 is standoff section 120. Standoff section 120 has the length $L_1$ and receptacle section 70 has a length $L_2$. For purposes of illustration, only one side of tubing 14 is shown together with stop 18. In this illustration stop 18 includes a shock absorbing spring 122 which absorbs the impact of the delivery system. Head 118 is provided with a surface 124 which contacts the spring of the stop 18. Standoff section 120 has a sufficient length to allow the receptacle 70 to be positioned below the lower end tubing 14. This is advantageous because it allows the chemicals in the receptacle to diffuse in the wellbore below the tubing, rather than diffusing inside the tubing. Generally, the treatment of the formation will be more effective when the chemical diffuses directly into the space below the tubing. Preferably, the chemical dispenser 116 is dimension such that at least a portion of it will pass through the stop. An advantage of the present invention is that the assembly can be constructed to place the dispenser at a predetermined location in relation to the stop. Pressure drop occurs across the stop during operation, and this pressure drop can produce temperature and pressure changes which cause scale deposits to form in the stop. If scale deposits are allowed to buildup [it] on the stop, the deposits can become great enough to cause the plunger to become stuck in the stop. If this occurs, it may be necessary to use wireline removal techniques, or a rig to pull the tubing. With the present invention treatment chemicals are delivered and concentrated in the vicinity of stop, and thus scale formation can be very effectively treated. Indeed, the dispenser can be configured to come to rest within the stop for treatment of scale, and later reconfigured to add in the stand off section to provide treatment below the stop.

Please replace paragraph [0032] with the following amended paragraph:

**[0032]** Figure 9 shows another embodiment of the present invention. In Figure 9 the plunger 146 does not have a neck at the lower end, but rather has an annular end 150 which has an inside threaded surface 152. The chemical dispenser 162 is a tubular member having a reduced diameter portion 164 at the top which has threads on its outside surface 166 for engaging the threaded surface 152 of plunger 146. Dispenser 162 defines a receptacle 168 for holding chemical 170. The plunger has lower ports 172 and one or more upper ports 174. To load the dispenser 162 with chemicals, the dispenser 162 is removed from the plunger 146 and the chemicals are inserted through the opening 176 at the top. If desired, such an assembly can also be equipped with a valve (not shown) to restrict flow into the lower ports 172.

Please replace paragraph [0033] with the following amended paragraph:

**[0033]** Figures 10 and 11 illustrate yet other embodiments of the present invention. These embodiments use known plungers as carriers for the chemicals. Figure 10 illustrates a coiled tube plunger 44. In this embodiment of the invention, the space between coiled member 180 of plunger 44 is partially or completely filled with chemical 182. Chemical 182 may be in the form of a paste or treatment chemical formed into an appropriate consistency for packing into the space between the coils. In Figure 11, a wire brush plunger 48 is shown. In this embodiment of the invention, the brush portion 50 of the plunger 48 is impregnated with treatment chemical [84] 184. The treatment chemical can be applied in the form of a spray, paste, or gel. Preferably, it has the consistency which will be retained on the brush as it falls through the tubing. The embodiments of Figures 10 and 11 have the advantage of utilizing existing plungers as the delivery system. They have the disadvantage, however, that when the plunger comes to rest on the stop the treatment chemical will be positioned in the tubing. Thus, the chemical must be dissolved within the tubing and then migrate to the formation to provide treatment. This embodiment has an advantage in the treatment and prevention of paraffin deposits.

Paraffin problems usually occur above the stop. Generally, paraffin problems occur above the 2000 feet level, and most commonly occur from about 1500 to 1600 feet from the surface. In the past, plungers aided in the removal of paraffin deposits because as the plunger passed the deposit it would tend to [scrap] scrape off some of the paraffin. This embodiment allows for the delivery of chemical along the tubing to prevent or minimize paraffin deposit and build up.

Please replace paragraph [0034] with the following amended paragraph:

**[0034]** Figure 12 illustrates plunger/dispenser 190. Previous embodiments discussed related to a chemical dispenser to be attached to a known plunger and a modification of the known plunger by the application of treatment chemical to be useful in the present invention. Figure 12 relates to an embodiment of the present invention in which the device is specifically configured to be both a plunger and a chemical delivery system. The assembly has an upper portion 192 which includes an interface section 194. Interface portion is that portion which is adjacent to the inside wall of the tubing. The interface section may be coiled tubing, a brush, pads, wobble rings or other known interface sections. The interface section fits inside the tubing snugly. When the pressure is released from the well and the plunger travels to the surface, the interface section serves to retain much of the fluid above the top of the plunger above the plunger so that it may be pushed out at the well head. Below the interface section is the lower section 196. The lower section 196 can include any type of receptacle to receive chemicals, such as an absorbent pad or matrix, or other suitable structure as described above. In the illustrated embodiment, the receptacle is a stiff wire mesh 198, and chemical has been deposited in the interstices between the mesh. A lower port 195 can be provided at the bottom, and a series of ports 197 can be provided along the length of lower section 196. Thus lower section 196 defines a receptacle having one or more upper ports and one or more lower ports. This embodiment also has a standoff section 200 for elongating the system such that all or a portion of the receptacle will be below the end of the stop on the tubing. The lower end of the upper section [194] 192 is of reduced diameter to provide surface 202 for

contacting the stops. A neck 204 is provided on the top. Figure 13 is a cross section of Figure 12 along line 13-13. The cross section is of a multipoint star design. This design increases the surface area of the dispenser exposed to the well liquid and provides flow paths for the liquid. In the preferred embodiment the chemical receptacle portion 198 of the apparatus 190 is of small enough dimensions to pass through the stop at the bottom of the tubing.